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THE UNIVERSITY OF THE STATE OF NEW YORK

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Arbor Day Number

This Pond Provides an Ideal Setting for a Wild Garden

See article by Julia H. Cummins

Making a Wild Garden

BY JULIA H. CUMMINS, UTICA

Wild gardens have become so popular in the past few years that a description of one which we have developed may have interest. As it lies in the foothills of the Adirondacks where the thermometer often drops to 20 degrees below zero, and occasionally to 45, the plants which have proved hardy in this garden should survive anywhere provided the soil and the exposure are suitable.

In the first few years of its growth the question often arose: Should a wild garden be a garden of wild flowers only, or should it be a garden in which all sorts of flowers are allowed provided they take care of themselves — a garden run wild, so to speak? We wished to do all the work in it ourselves and therefore it must not require too much attention, and on the other hand, we did not wish a jungle of growth which would be without order and in which the stronger growing plants would run out the choicer specimens.

We have compromised by admitting some garden flowers which are obviously suitable, such as bog primulas, and by arranging our plantings not in regular flower beds but in areas of prepared soil along the little footpaths which are the natural means of getting about. Each area is confined to plants of similar growth — the small shade-loving things among a few rocks in wood's soil and under young trees, the bog plants in their own proper environment, the tall meadow flowers by themselves in a dry, sunny spot, etc. Moreover, we have tried to plant a number of one kind in each group rather than to collect a great number of different specimens, for wild flowers lose their effect unless they grow in masses. Only enough weeding is done to give each plant a chance to develop, and many wild things which seed themselves are allowed to act as fillers so long as they do not crowd out the planted material. They give the natural look which is so desirable, and conceal gaps when flowering is over.

We are fortunate in having a little pond, long and narrow, and so situated that in a comparatively small space we find a variety of conditions — sun, shade, dry sandy soil and bog. Therefore in the list of planting material which we have grown there may be suggestions that will be helpful for several types of gardens. The pond is pictured on the previous page.

At the far end of the pond, growing in bog and full sun, are the showy plants which make a bold effect seen at a distance — cat-tails, joe-pye weed, swamp milkweed, boneset, ironweed, swamp azalea, marsh marigolds, pitcher plants, pickerel weed and cherry-colored loosestrife. All these were collected except the loosestrife, which was raised in the vegetable garden from one packet of seed. It now grows all along one side of the pond, and can be seen in bloom at the left of the picture and growing along a mossy log which has fallen across the water. As it has, perforce, been trimmed out and thrown into a river which flows near-by it has established itself in brilliant clumps for a mile or more along the banks.

Nearer the eye as one looks along the pond, but not visible in the photograph, are masses of iris — in the water itself the native blue and the wild yellow iris, both collected; in the moist earth, but not bog, the Japanese and Siberian irises, mostly raised from seed and now making exuberant growth in the sun.

Still nearer, a narrow strip between the pond and the footpath which winds beside it is filled with plants which prefer partial shade and moisture. These are planted in groups interspersed with royal ferns, Solomon's seal, false Solomon's seal and baneberries. Among them are yellow ragwort, whose basal leaves, like large violet leaves, are its chief beauty, cardinal flowers, giant lobelias, yellow lady's-slippers, Canada lilies, purple-fringed orchids, forget-me-nots, grass of Parnassus, ladies'-tresses and white snakeroot. Each of these has been collected but with the precaution (as with all wild flowers) of taking a good bit of the earth in which it was growing with each plant and of digging deep enough to get every bit of the root.

This strip of flowers stretches along the edge of the pond to the near end and here, at our very feet, is the lovliest feature of all. The showy lady's-slippers grow here in quantities interspersed with ferns. They were collected from a swamp where they are to be found in hundreds growing on hummocks in a foot of water. In our first experiment with these we

were afraid to try more than one clump for fear our different conditions might not suit them. The following spring when there was no sign of them our disappointment was great, but suddenly in May fat green snouts broke through the soil, looking like asparagus tips and shooting up equally fast, and in June the grooved leaves and swollen pink and white pouches filled us with delight. Since then we have added to the collection so that this end of the pond is dominated by them.

In all the collecting we have never gathered in quantity until we have been convinced that the plant would be equally happy in its new conditions, and we have always left a profusion behind. These should be axioms of every flower lover.

Small shade-loving plants which thrive in leaf mold have been planted on a slight slope beneath the thin foliage of birch trees, and with rocks placed here and there to give a natural look. Among the flowers which flourish here without any particular care, and which would do well in a shaded corner anywhere, are the large white trillium, foam flower, miterwort, wild ginger, hepaticas, violets of all sorts, blood root, partridge berry, daphne, dog-tooth violets, Dutchman's breeches, wild columbines, wild phlox and Virginia bluebells.

For the plants which require special diet we have made pockets between the rocks filled with acid fibrous soil gathered from beneath hemlock trees. Here we grow the painted trillium, showy orchid, wintergreen berry, bunchberry, clintonia and moccasin flower. All these were collected but there are two treasures bought from a nursery which we could hardly do without. One is *iris cristata*, a little creeping iris growing only a few inches high, bearing a profusion of lovely lavender flowers in May, and not particular as to soil. The other, *iris verna*, is similar to the *cristata* but it has an orange center and demands acid soil.

Our soil lies on a limestone formation and is therefore neutral. It is not suited to such acid-loving plants as the rhododendrons, heaths and azaleas. We have tried some experiments with these, using aluminum sulphate and special soil, but as the shrubs never looked really happy and thriving we have preferred to cultivate plants which do not need so much fussing.

In the dry, sandy area where there is constant sunshine we have naturalized all sorts of wild asters. If one is on the lookout for unusual colors in these flowers it is possible to collect from roadsides and meadows just as beautiful specimens as can be bought in hybrid forms and at high prices from the nurseries. With the assistance of aluminum sulphate we also grow here wild lupines and closed gentians, both acid lovers. Vipers bugloss and chicory are biennials and often must be collected over again if they fail to resow themselves, but they are worth the trouble.

Here also is the handsome orange butterfly weed. This can be raised easily from seed and it is easier to grow it in that way than to transplant it from the wild. Other plants raised from seed are galega or goat's-rue, tall meadow rue, wild senna and the evening primrose usually known as sundrops. Some of these may properly be called garden flowers, and the question arises should garden flowers be planted in a wild garden? To our own satisfaction at least we have settled it in this way: if a garden flower is so rampant in growth that it will take care of itself, and if it is not too closely associated in one's mind with cultivated flowers, it may be given a trial in the wild garden.

For the most part all the flowers mentioned in our list may be found in the book published by the New York State Education Department, Wild Flowers of New York, which we have found invaluable.

Protect the Dicentras in Their Native Woods

BY ELSIE GIBSON WHITNEY, NEW YORK STATE MUSEUM

During the past few years our attention has been increasingly directed toward the needs for conserving whatever is possible of some of our vanishing native wild flowers. Whether the emphasis is laid chiefly upon esthetic or upon utilitarian needs depends largely upon the point of view of the person or organization urging conservation, but neither motive stands alone; in every case the useful and the beautiful are inextricably mixed, and both are equally "practical."

As a basis for workable conservation measures there should be a better understanding of the life history and natural requirements of

Courtesy Brooklyn Botanic Garden

Dutchman's Breeches
The pendant seed pods suggest the name "ear drops."

the various native plants. Such information will help us not only to maintain the best possible surroundings for the plants to carry on their normal development, but also to realize that each species of wild flower is something quite unique and individual in its own life and in its rôle in nature. When it is realized that for certain plants the flowers which attract us by their color, fragrance or form are most vital for the species to maintain its existence, we shall more often refrain from picking them for our fleeting pleasure.

All too frequently we think of a plant only when we see it in bloom, with little realization of what it is doing all the rest of the year. Yet its other activities may be quite as interesting, though not so spectacular, as its flowering. Let us look into the life history of our native species of the Fumatory family as an example of this.

Probably the best known and most common of our native species of this family (the Fumariaceae) are the two Dicentras — Dutchman's breeches (*Dicentra cucullaria*) and squirrel corn (*Dicentra canadensis*).

The genus Dicentra is composed of perennial plants with delicate, finely cut foliage, reminding one of sprays of maidenhair fern. The individual leaves and the flowering scape arise from an underground bulbous base. In Dutchman's breeches (*Dicentra cucullaria*) this base is a scaly bulb formed of the fleshy, triangular and persistent bases of leaf petioles. Each season a mature bulb sends up several leaves and usually one flowering stalk, on smooth, slender, rather brittle and half-translucent stems. The pale green leaves are very much divided into narrow rounded segments. The flowering scape, five to ten or more inches high, stands stiffly erect half its length above the leaves, and from it hang the yellow-tipped white flowers, from five to a dozen in number. Only close examination reveals that these curiously shaped pendants are really made up of the usual floral parts. The two sepals, reduced to the size of scales, are attached at the base between the two halves of the flattened body of the flower, and soon drop. The four petals are arranged in two pairs. The outer pair is more or less folded in the middle, and

projects at the base into two widely diverging spurs. A constriction near the tip draws each of these petals close to the narrow inner pair. This second pair closely enfolds the pistil, and their curiously crested tips form a little pocket covering the lobes of the stigma. The stamens are six in number, forming a group of three within each pouchlike petal. Their filaments are separate to the tips, but there they are joined lightly together, bringing the anthers into close proximity to each other, and all are included in the little pocket formed about the stigma by the tips of the inner petals. From the base of the middle filament of each group a horn-shaped process projects into the spur of the petal, and on these two projections are found the nectaries. This arrangement will be referred to later when pollination is discussed.

Squirrel corn (*Dicentra canadensis*) in general appearance follows the description for Dutchman's breeches, but the individual flowers are tipped with lavender rose where the others are yellow, and in place of the long divergent spurs the outer petals have semicordate bases, forming the heart-shaped flowers so well pictured in the accompanying photograph. The underground part of this plant is a hard yellow corm, ranging in size from that of a small pea to three-eighths of an inch or more in diameter. The smaller corms develop one or two leaves, but only when they have reached the larger sizes do they produce a flowering stalk. They are frequently found in small clusters of various sizes together, and the resemblance to kernels of corn has given the plant its local common name. Farther south, when both this plant and the wild turkey were more abundant than now, it was called turkey corn or turkey pea.

The seeds of the two plants are very similar — small, somewhat flattened and dark brown to black in color — and are borne either side of the thin membranous partition which divides the seed pod lengthwise. All observers seem to agree, however, that one very seldom finds any seed. The rare but graceful pendant pods are well shown in the photograph of Dutchman's breeches.

How do these delicate plants perpetuate themselves, or travel from wood to wood? In the arrangement of the floral parts it was found that the anthers were brought close to

Photograph by Morten Carlisle
Courtesy of Wild Flower Preservation Society

Squirrel Corn or Turkey Pea

the stigma and inclosed with it in the little pocket formed by the tips of the inner petals. By such close contact Nature has made certain that the pollen from the anthers is deposited on the stigma of the same flower. But self-pollination in these plants is not effective for developing seed. It is only when pollen from another flower, or better yet, from another plant of the same species, is deposited on the stigma that seed is developed. For the means by which such pollination is accomplished we must consider one of the curious adaptations between insects and flowers.

The nectar, for which insects chiefly visit flowers, is secreted in the spurs in Dutchman's breeches, or at the base of the heart-shaped petals in squirrel corn. Only an insect with a long proboscis could reach to this pocket from the natural opening at the tip of the flower. So it is not surprising to find that it is the "long-tongued" bumblebees of the genera *Bombus* and *Anthophora*, who come seeking nectar from these flowers. Through such visits cross-pollination is effected. When the bee alights on the tip of the flower and attempts to push open the side petals in order to insert its long proboscis, its weight and the push swing aside the little pocket covering the anthers and stigma, and the hairs on the underside of its body brush away from the stigma the little pile of pollen which has accumulated from the ripe anthers. If the bee has just come from another Dicentra this act may mean brushing off onto the stigma pollen from a previously visited flower, or he may simply wipe from the stigma the pollen of its own flower, leaving it clean for the next insect visitor to pollinate. If the next flower he visits is one of the same Dicentras he may effect cross-pollination and so the possibility of seed, while he sends his long proboscis down to the bottom of the pouch petal to get the nectar secreted there.

Sometimes one finds a little round hole cut at the base of the pouch, brown around the edge if it is not just freshly made. This is said to be the work of a bee whose proboscis will not reach from the regular opening, and to gain the nectar he bites through from the outside. While he obtains the nectar by such a method, it is apparent that his visit in no way helps to effect the desirable cross-pollination. Since self-pollination which Nature has assured by the construction of the flower parts is not effective for reproduction, and as there are so many possible slips in the chance visits of very specialized bees, one may readily see that the development of seed is indeed an uncertain affair. No wonder Dicentra seed is so seldom found!

Rich and friable leaf mold, accumulated over a long period of years between crevices of rock and tree roots, where drainage is thorough, forms the necessary food supply and provides soil easily penetrated by such underground parts as these plants have. Only in a hardwood forest of long standing, with its annual accretion of fallen leaves and small twigs, is such leaf mold developed.

The Dicentras bloom early among a host of flower neighbors. Other plants blossoming at about the same time and in the same general habitat include jack-in-the-pulpit (*Arisaema triphyllum*); several species of trillium — the large white trillium (*Trillium grandiflorum*), wake robin (*Trillium erectum*), and painted trillium (*Trillium undulatum*); Solomon's seal (*Polygonatum biflorum*) and false spikenard (*Smilacena racemosa*); the bellworts (*Uvularia perfoliata* and *Oakesia sessilifolia*); adder's tongue or trout lily (*Erythronium americanum*); miterwort or bishop's-cap (*Mitella diphylla*) and foam flower (*Tiarella cordifolia*); baneberry, red and white (*Actaea rubra* and *Actaea alba*); blue cohosh (*Caulophyllum thalictroides*) and many others that one will recall from his own experiences afield in mid-May before the woods are in full foliage.

When the underground parts of these plants are examined it will be found that the great majority of them have either a roundish corm, as jack-in-the-pulpit and squirrel corn, or a bulb, as in trout lily, or a rhizome, as in Solomon's seal, from which the leaves and flowers are developed each season. In each case there is thus provided a storage body where food materials are stored for the winter safely protected amid the deep duff and fallen leaves, under a blanket of snow. During the fall and winter when we can see no evidences of the plant, its growing activities are not entirely stopped as we may think, but only proceeding at a comparatively slow rate. Within this underground structure the food materials which have been stored during the summer are being prepared for ready use; the half-formed buds of leaf and flower are further developed, and everything is made ready for an early start in

the spring. Then within just a few weeks, while warm rains and sunshine are stirring the trees into leaf, the plants of the forest floor burst into activity. Before the leaf canopy of the trees is so fully formed that it shades the ground beneath, these plants utilize the abundant sunshine which comes through to the ground to develop leaf and flower, to set seed and to get well under way the manufacture of food materials to store for next season's development.

Then just as essential as the sunshine has been, is the later shade of the tree canopy to protect these same plants during the summer heat. At this period they proceed more slowly to complete the storage of food in the underground body, and to organize the following season's leaf and flower buds. It is because of the ready food supply stored in the bulb or rhizome that the plant is able so quickly to reach its full development and complete its essential functions in the following spring, before the shade of the trees becomes so dense that the necessary sunlight is cut off.

A moment's reflection will show that these conditions of a thick bed of leaf mold and its annual blanket of fallen leaves, the alternating periods when the forest floor is exposed to full sunshine through the naked branches and then is protected from too great heat and drought by the shade of the developed leaves, are not found in a forest of evergreen trees. We recall that we have found these spring flowering plants of which we have been speaking in hardwood forests of maple, hickory, birch and beech, with perhaps pine or hemlock scattered here and there.

It has taken many years for the individual trees to grow, and the development of the association of these trees into the forest community a much longer time. The decay of leaves and twigs to form such a bed of leaf mold as this in which we find the bulbous Dicentras may have taken centuries of time. Yet this whole slowly built scheme of things which appears to be absolutely essential to the life of these interesting plants, whose construction and seasonal activities are a challenge to our imagination and whose fragile beauty is a source of enjoyment and inspiration — all this may be wiped out in a few hours through the careless use of fire, perhaps, or in a slightly longer time by the ruthless slashing of ax and saw, or in a few seasons' grazing by farm animals.

We can tolerate no possible excuse for such loss by forest fires. Aroused public sentiment will make that unthinkable. There will still be cutting for timber, or clearing for roads, for which the economic urge is still so strong. And few woodlots are kept unpastured. But if these economic needs of mankind must be satisfied, so also must the higher desires be considered. Let us therefore wherever possible protect against destruction the woodland areas where in a wholly natural state the native forest flora may grow and develop unmolested by any agency of mankind.

In such an environment the shy Dicentras are given the best opportunity to maintain their existence. For our part, knowing how necessary are the delicate leaves to manufacture food for the plant, we will take care during our rambles in the woods not to trample them. And if the flowers have a hazardous time at best to produce seed for the next generation of plants we will not add to their difficulties by gathering the stalks for the fleeting pleasure of a few hours.

Let us rather enjoy them in their woodland surroundings, and there with patience we may discover further interesting facts about them. Who knows, for instance, what the first little seedling is like or when the little yellow corms begin to be formed? How do they travel and find new homes in congenial habitats? Any attempt to find the answers to such questions as these will increase our admiration for the miracles of these little plants and our desire to preserve those woodland sanctuaries where perhaps they may be lured back into many a cool glade when they seem to have vanished forever.

Bird and Flower Plates Available

The State Education Department still has available a number of the portfolios of bird plates and of wild flower plates reprinted from New York State Museum Memoirs, Birds of New York, and Wild Flowers of New York. These plates are sold at the cost of printing. The portfolios of bird plates may be obtained for $1.20 a set. This amount includes postage, wrapping and insurance charges. The portfolios of wild flower plates may be obtained for $2.50 a set, plus postage. The mailing weight is five pounds. The orders should be sent to the Finance Division of the State Education Department, Albany, N. Y., and the remittances should be made payable to the Department.

The University of the State of New York Bulletin to the Schools

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CHARLES F. PROBES, *Editor*

This bulletin is sent without charge to all schools and educational institutions of the State. To others it will be mailed postpaid for 50 cents a year, 5 cents for single copies.

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APRIL 1, 1931

Arbor Day Dates

The dates of April 24th, May 1st and May 8th have been designated by Commissioner of Education Frank P. Graves for the observance of Arbor Day in this State. In his Arbor Day proclamation, printed in the March 2d issue of the Bulletin, Commissioner Graves recommended that local authorities determine which of these dates shall be used. He suggested, however, that in general Arbor Day be observed on April 24th in the southeastern part of the State, on May 8th in the northern part of the State and the Catskill region, and on May 1st in the rest of the State. New York City schools will observe Arbor Day on April 24th.

Assistance in the preparation of this issue of the Bulletin was given by the New York State Museum, of which Dr Charles C. Adams is Director. The appreciation of the Editor is expressed to him and to the contributors.

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Tree Planting for the 1932 Washington Commemoration

BY H. D. HOUSE, STATE BOTANIST

Many organizations throughout the country are already sponsoring a tree-planting program in connection with the commemoration of the 200th anniversary of the birth of George Washington. Although the official observance of the anniversary does not begin for another year, to assure a successful program an immediate start should be made toward securing and planting desirable species of trees, which will then be ready for dedication in 1932. In this way failures can be replaced in the spring of 1932.

George Washington's love for trees is well known. He was himself a planter of trees. He recognized their utility and their value for fruit and ornament, and foresaw the great economic values to be derived from the great forests of the country, which at that time had not been greatly depleted. The broad utilization of this idea in connection with the commemorative program for 1932 is thus most fitting and opportune.

The American Tree Association proposes a program of tree planting upon this occasion which will utilize at least ten million trees. It is hoped that they will be planted singly or in groves, in locations where they will be often in the eyes of future generations as a reminder of the father of his country and his own love for trees and his appreciation of their value.

A knowledge of the habits and requirements of trees is essential to their successful planting. Some trees require a moist, fertile soil, and others will thrive in compartively poor or sterile soil. Some trees are more suited to broad avenues and large or spacious grounds and will not endure the smoke and dust of the crowded city. It is obvious, therefore, that much trouble and expense for future care and disappointment over results may be saved by planting the right kind of trees in their proper surroundings.

In nearly every community there is someone, a nurseryman or an expert tree man, who knows what trees are most suitable for a given purpose, where they can be obtained, and how and just when they should be transplanted. Such a person is indispensable to the success of a commemorative planting such as this and should be invested with the authority and means for the successful carrying out of this part of the program so far as it relates to the actual securing and planting of the young trees.

In planning for the commemorative planting the first thing to be determined is how much money can be made available for the purpose, which itself must be governed to a large extent by the space available for the planting. A single tree well transplanted may cost $10, but a grove of several should cost proportionately less for each tree. For planting along an avenue or in a park, municipal or town cooperation is essential, and no time should be lost to have all details harmoniously arranged before 1932.

There are several very desirable trees of foreign origin, but for this purpose it would seem more fitting to use native American trees. They should be trees which are hardy, long-lived and reasonably free from recurrent attacks by insects and fungi. Among such trees are the white oak, red oak, pin oak, American plane tree or sycamore, sugar or hard maple, linden or basswood, American or white ash and elm. Such trees as these can be recommended for both country and city planting in this section of the United States. They are hardy, symmetrical in form, yield abundant shade, are cleanly in habit and long-lived. Where some evergreens are also desired the selection must be made with greater care. White pine if properly planted will doubtlessly succeed in most sections of the State. Red cedar thrives well in the southern part of the State, while balsam fir, white spruce and red pine are more desirable in the northern part of the State and across the middle of the State where suitable soil conditions are available. In all cases the advice of a practical tree man is most essential. Certainly to be avoided is the use of short-lived trees like the box elder, soft maple, poplars and ailanthus.

The State Conservation Commission can not supply trees for any other purpose than forest planting. Trees to be used in this connection must therefore be secured from private tree nurseries or from the woods. Trees growing in the woods if large enough for this purpose are apt to be very difficult to transplant, and better results are usually obtained from nursery-grown trees. The State Conservation Commission and the State Botanist, both located at Albany, will be glad to offer suggestions in regard to particular difficulties encountered.

Photograph by Guy Bailey

Large Yellow Lady's-Slipper (Cypripedium pubescens)

Adequate Playgrounds and Appropriate Plantings for a Rural School

A Constructive Arbor Day Program

BY HENRY R. FRANCIS, PROFESSOR OF FOREST RECREATION, NEW YORK STATE COLLEGE OF FORESTRY, SYRACUSE UNIVERSITY

Photographs by the author

In the early days of the extension activities in education of the New York State College of Forestry at Syracuse University, much attention was given to constructive Arbor Day programs. Frequently in the rural districts, as well as sometimes in the cities, these programs took the form of general landscape improvement projects. In these enterprises the schools took an effective part. In order to present in detail one of the many successful projects that was carried out in this way, the following account is written. It is about the work that was done in the school district of Fayetteville.

Some weeks before the date for Arbor Day there was held in the school auditorium a popular evening lecture on the general subject of "Beautifying the Surroundings with Trees and Shrubs." The civic improvement organizations, such as exist in every village in New York State, for example, the Grange, Village Improvement Society and many social clubs, were inspired to cooperate with the school board in seeing if steps could not be taken to put into the ground some of the trees, shrubs and flowers that had been shown attractively growing in connection with school buildings, home grounds, parks, streets, country roadsides and watershed areas of reservoirs.

Upon an offer of a representative from the State College of Forestry to visit and study the needs of all the places where improvements by planting were contemplated, committees for purposes of a canvass were appointed at the time of the initial illustrated lecture. Machinery was thus set in motion so that the program could be carried out extensively and effectively.

As a result of the cooperative endeavors of the interested organizations throughout the district, a carload of trees, shrubbery, rosebushes and hardy perennials were ordered to carry out the plans that were worked out in detail for every individual location where planting was proposed. By combining the individual needs into one large order the nursery was glad to quote the very lowest prices possible. The size of the cooperative purchase was indeed large.

In addition to the purchases of nursery-grown planting stock, a few persons went to the near-by woods for the purpose of bringing to their homes a few native shrubs. This activity requires skill on the part of the transplanter and a willingness on the part of the woodland owner to permit removal of his wild, shrubby plants.

The specific items of improvement that were found to be most needed when the canvass was made were shade trees for the village streets and the country highways, plantings around the foundations of the many residences where little or no planting had been done hitherto, trees and shrubbery for the small parks and squares, shrubbery in appropriate places on the school grounds, vines for the bare walls of factory buildings and forest trees for the watershed of the village reservoir.

Residence with Shrubbery One Year after Planting

Now that a period of 17 years has elapsed since this constructive Arbor Day program was initiated, there results not only much concrete evidence of a wholesome beautification character, but also examples of the sorts of planting material that have made the most thrifty growth. Like many other ornamental planting projects, this one received little cultural attention after the first two years. Consequently, the varieties of trees, shrubbery, vines and other classes of planting stock that have stood the test of this amount of time should indicate the choice of planting material that other communities in central New York may use with fair assurance of success. In other sections of the State additional other varieties may be used successfully. It is safe to rely, however, upon these tested varieties for the main part of similar ornamental planting projects in all parts of the State of New York.

Same Residence as Above 15 Years after Shrubbery Was Planted

Shade Trees

AMERICAN ELM (*Ulmus americana*)

This is unquestionably the most attractive shade tree which grows widely in New York State. It is comparatively rapid in its rate of growth where soil conditions are favorable. These conditions are clay loam of a depth sufficient to sustain congenial root environment during the summer drought period. The American elm needs to be spaced at least 40 feet when planted as a street tree. A spacing of 60 feet is better.

NORWAY MAPLE (*Acer platanoides*)

This is one of the best shade trees that has been introduced from Europe. As a general practice it is used in preference to our native maples.

RED OAK (*Quercus rubra*)

The fastest growing of all the native oaks. On account of the large size which this tree attains when in favorable surroundings, it should be given sufficient space in which to develop. A good tree to plant as an individual specimen or in a group.

NORWAY SPRUCE (*Picea excelsa*)

A tree from central Europe which has been liberally and extensively used in New York State. A shallow-rooted evergreen tree making a rapid growth on various soil sites. No severe enemies have thus far developed to prey upon this tree. When planted isolated from other trees in full enjoyment of light and soil, it develops a pyramidal form with graceful, recurved branches.

Large Shrubs

BUSH HONEYSUCKLE (*Lonicera tartarica*)

An excellent shrub for use in masses at the corners of large school buildings or for the borders of the grounds. The flowers are in bloom in May, and during the summer its brightly colored berries attract the birds.

LATE LILAC (*Syringa villosa*)

A good lilac to use in combination with other varieties of this old-fashioned shrub. It produces its lavender flowers when other lilacs have finished blooming.

ARROWWOOD (*Viburnum dentatum*)

It is difficult to name another shrub which is generally more useful for school grounds. It is attractive throughout the year.

NINEBARK (*Opulaster apulifolia*)

For a coarse-textured shrub to be used in rough places such as embankments and steep slopes, this variety is recommended. In addition to this advantageous feature it has the characteristic of quick growth.

Medium-sized Shrubs

GOLDEN BELL (*Forsythia intermedia*)

For early flowering no shrub is more attractive than golden bell. As its name implies, the flowers are bell-shaped and golden yellow in color. The foliage has a luxuriant appearance. It is unusually attractive when planted in masses.

WHITE KERRIA (*Rhodotypos Kerrioides*)

A sturdy, vigorous shrub with good foliage and bright, white flowers, resembling a small rose. The black, shiny, hard seeds remain on the branches all winter.

VAN HOUTTE'S SPIREA (*Spirea vanhouttei*)

A very graceful shrub bearing a profusion of white flowers in early June. A very hardy shrub. The blossoms coming while school is in session make this shrub desirable for school grounds.

Small Shrubs

JAPANESE BARBERRY (*Berberis thunbergii*)

For a small graceful, compact-growing shrub this ranks high in the estimation of garden makers.

GLOBEFLOWER (*Kerria japonica*)

Very few small shrubs produce yellow flowers. This is a characteristic of the globeflower. The green stems are also attractive in winter.

JAPANESE ROSE (*Rosa rugosa*)

For school ground planting, this shrubby rose is more desirable than the garden roses, which are grown only for their large blossoms. The vigor and the sturdy character of this Japanese rose makes it attractive at all times, but most especially is it pleasing in June, when it is dotted with its single or double roses, depending on the variety you plant.

Vines

ENGELMAN'S CREEPER (*Parthenocissus engelmanii*)

This creeping vine is very vigorous. It will grow luxuriantly on the northern walls of school buildings.

EVERGREEN BITTERSWEET (*Evonymus radicans*)

This vine is perfectly hardy and withstands the severest climate, remaining green throughout the winter.

The above is intended only as a suggestion of the large number of trees, shrubs and vines that are available to use in New York State. Any person familiar with the planting material for his neighborhood can expand the list easily. The essential point to be emphasized is the necessity in most communities to do something constructive in connection with Arbor Day. There are other features also that might be considered where a school district can not undertake this year a general beautification project. A few of these activities which can be performed successfully by school children are the planting of a school forest, the making of a local shade tree census and the making and erecting of bird houses.

New York's Great Reforestation Program

BY HERBERT F. PRESCOTT

New York State is now engaged in the greatest reforestation project ever undertaken in this country — the planting of 1,000,000 acres of productive state forests within 15 years at a cost of not to exceed $20,000,000. It is at the same time encouraging the planting of county forests by giving state aid to counties starting such forests on a dollar for dollar basis up to a maximum of $5000, the county to appropriate at least an equal amount.

For this great undertaking the State has had 30 years of practical preparation. It has developed a thoroughly efficient system of nursery practice, and more than 30,000 forest plantations aggregating more than 200,000 acres and meeting all possible planting conditions have been made.

In 1900 large areas of barren land in the Forest Preserve drew public attention to the need of forest replacement. In that year five acres were planted in the Forest Preserve. Between 1900 and 1908 about 2000 acres were planted in the Forest Preserve. In 1908 a law was enacted permitting the State to operate nurseries for the raising of forest planting stock and to distribute that stock at not to exceed the cost of production, and in 1909 the public generally was given an opportunity to begin the reclamation of idle nonagricultural land by planting forests on it. In that year forest projects were started on nearly 1000 acres of private lands. In the 20 years that followed, the reforestation movement grew and thrived. Farmers and other individual landowners, cities, towns, villages, industrial concerns who depend upon the forests for their raw products, fish and game clubs and various other organizations began to participate and as the benefits of the movement were demonstrated, engaged on a larger and larger scale until by the close of 1928 there were being planted in the State about 25,000,000 trees a year, or roughly, 25,000 acres.

As the State's nursery system grew and the available planting stock increased from year to year, the reforesting movement spread. Individuals and communities who undertook the reclamation of waste land by planting forests on it approved the results obtained and continued to plant, so that the reforestation movement in its early stages really sold itself to the public. The idea of putting idle, nonproductive land to work appealed to all who tried it. The reasons for starting forests were many and varied. In many cases farmers planted old fields, poor pastures and other land that had fallen into disuse. Cities and villages made plantations on the watersheds of their municipal water supply.

For ten years after the passage of the law permitting the distribution of trees at not to exceed the cost of production, it was difficult for the state nurseries to supply the demand. In 1922 former Conservation Commissioner Alexander Macdonald, upon assuming office, called in conference all of the agencies that had been working independently for the reforesting movement and sought to coordinate their activities in a general campaign of education, with the result that the movement which had been slowly but steadily getting under way, rapidly took on wholesale proportions. During that year there were planted from the state nurseries about four and a quarter million trees, or about 4000 acres, all of which, with the exception of about one-quarter of a million

Courtesy State Conservation Department

Scotch Pine Planted on a Hill

which were planted on state land, were planted by private landowners, municipalities and industrial concerns.

In 1930 there were planted in round figures 25,000,000 trees, of which nearly 8,000,000 were planted by the State and a trifle more than 17,000,000 by individuals, communities and industrial concerns.

In 1924, when the benefits of reforestation had been sufficiently demonstrated to convince the public generally of its desirability, Commissioner Macdonald recommended the planting of forests by the State, by counties and by municipalities as well as by individuals. Five years later legislation was enacted to put this recommendation into effect.

The Reforestation Commission, created by chapter 241, Laws of 1928, was authorized to investigate generally the subject of reforestation, with particular reference to ascertaining the location, value and areas of land in the State unsuitable for agriculture, but which might be utilized for reforestation, and the best means of promoting and financing reforestation within the State. One year later the Reforestation Commission prepared two bills which were passed during the legislative session of 1929 and became chapters 194 and 195. These laws are generally known as the county reforestation act and the state reforestation act.

Under the state reforestation act, the State is empowered to acquire lands outside of the Forest Preserve counties which are adapted for reforestation, and establish and maintain thereon forests. These reforestation areas must consist of not less than 500 acres of contiguous land, and it has been the State's policy in selecting them to choose areas in localities where it would be possible to purchase additional land. In one county the State has acquired two reforestation areas, one of 3600 acres and one of 600 acres. In all, the State had under contract up to the end of 1930 about 45,000 acres, and all of the land to which title had been passed by the Department of Law had been reforested.

The plan calls for the planting of 1,000,000 acres by 1944. It provides for the acquisition of 40,000 acres of land in 1930, 50,000 is 1931, 50,000 in 1932, 60,000 in 1933, 100,000 in each of the years thereafter up to and including 1941, and calls for the appropriation of $600,000 in 1931, $1,000,000 in 1932, with an increased appropriation of $200,000 each year up to 1937, and an appropriation of $2,000,000 each year thereafter up to and including 1942.

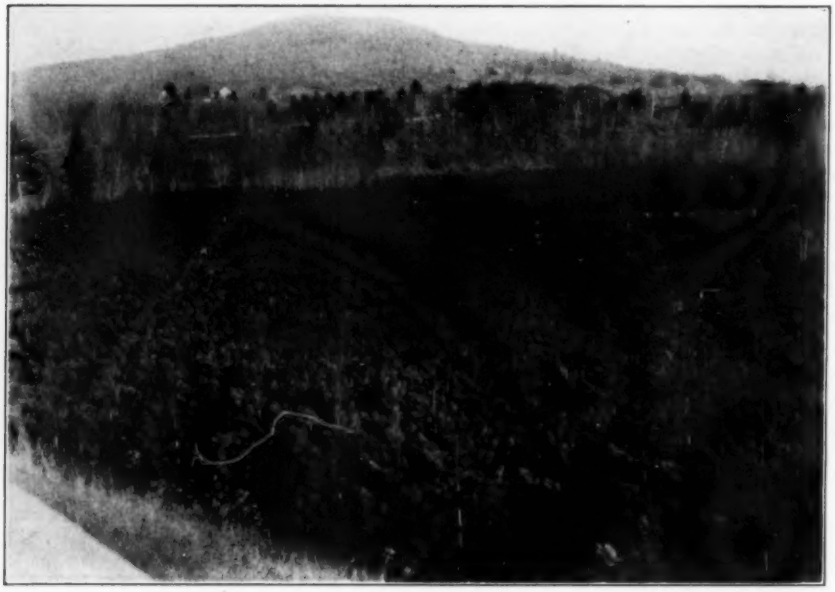
In working out the details of this great reforestation program, it was found that more than one-third of the total acreage of the State which was included in the Forest Preserve counties, so-called, was excluded from participation in the program as the Conservation Law provides that the Forest Preserve shall include the lands owned or hereafter acquired by the State within these counties, and section 7 of article 7 of the State Constitution provides that the Forest Preserve shall be forever kept as wild forest land. The Forest Preserve counties are Clinton, Franklin, Essex, Hamilton, Herkimer, Fulton, Lewis, Oneida, St Lawrence, Saratoga, Warren, Washington, Greene, Ulster, Delaware and Sullivan.

Within the Forest Preserve counties, which have a total area of over 12,000,000 acres, are the great Adirondack and Catskill parks, which include within their present boundaries between four and five million acres. The park boundaries include practically all of the heavily forested land in the Forest Preserve counties, and the great bulk of the Forest Preserve, which consists of state-owned land in the Forest Preserve counties. Outside of these great parks are farm lands, some forests and a large amount of land not suited to agricultural purposes and better adapted to growing forests than for any other purpose. To make profitable use of this last-named land that is better suited to growing forests than to any other purpose, it is now proposed as a part of the enlarged reforestation program to amend article 7 of the Constitution so as to permit the acquisition and planting of land in the Forest Preserve counties, but outside of the boundaries of the Adirondack and Catskill parks. Of such land it is estimated there are roughly 1,000,000 acres. This amendment to the Constitution, known as the Hewitt amendment, was passed by the Legislature of 1930 and by the Legislature of 1931 and will be submitted to the people for ratification at the election next November.

The main object of this amendment is to permit the purchase of idle lands suited to reforesting in Forest Preserve counties with funds specifically set apart for that purpose and of cutting the forests so planted when they mature. It would not permit the State to purchase for this purpose land that is now

Courtesy State Conservation Department

The Clifford R. Pettis Memorial Forest at Chubb Hill



Courtesy State Conservation Department

Twenty-six Acres of Red Pine, Nine Years Old, Planted on Borrow Pit near Boiceville Bridge, Ashokan Watershed

reforested. It would permit the purchase only of land best suited for reforestation. It would not permit the cutting of any trees on land in the Forest Preserve, nor would it interfere with the purchase of land for the Forest Preserve which is being added to every year. Under the enlarged reforestation program, it is planned to have the State acquire the larger areas requiring reforestation in all the counties where such land exists.

The second part of the plan calls for the reforestation of smaller areas by the counties themselves with the assistance of the State, the State giving aid to each county on a dollar for dollar basis up to a maximum of $5000 in any one year to any one county. Up to the close of 1930, 20 counties were actively participating in the county forest program and a number of other counties were studying the question with a view of participating.

Accompanying this article are several illustrations which explain better than could be explained in the text the growth of the reforesting movement from its early stages. They show why thousands of persons have joined this movement to make profitable use of waste land and the results they have attained and are attaining.

A forest of Scotch pine planted in 1909 by John Adams in Hamden, Delaware county, was set out in an endeavor to hold the stones on a side hill from rolling into the highway. The illustration shows how effectively the sturdy Scotch pines have accomplished this.

The Clifford R. Pettis Memorial Forest between Lake Placid and Saranac Lake covers several hundred acres of land that prior to its planting was an unsightly burned-over area in the Forest Preserve.

Private Forest Planting

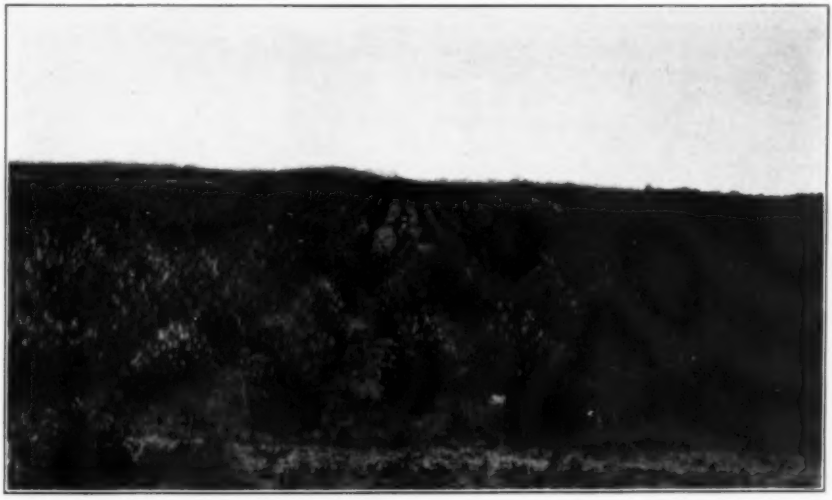
BY T. C. LUTHER

You ask me what private forest planting can accomplish and I will answer by explaining what I have been able to do in reforesting about 4000 acres of a private forest preserve of nearly 7000 acres situated 30 miles north of Albany in the towns of Stillwater and Malta in beautiful Saratoga county. Near-by the State of New York is developing the health-giving qualities of the famous mineral springs at Saratoga and just east and almost adjoining my property is the Saratoga Battlefield Park. In 50 years with the growth of the reforested areas in the preserve I hope that my efforts may add to the general beauty and to the development of the State.

When I first started lumbering some 40 years ago I began purchasing the lands on which stood both mature and growing timber. With these lands there were naturally many acres without any tree growth since much of this property was abandoned farm land. I resolved to cut only the larger trees, leaving the smaller ones to grow to maturity. The wisdom of this plan was soon apparent, for the small trees left in logging grew more rapidly so that in one case I cut over one small section of my holdings three times within 30 years, and at the present time the growing trees have again reached maturity and the crop is ready to be harvested. This system is called selective cutting and where properly carried out it brings a quicker financial return than reforesting lands.

In 1915, after several consultations with the late Clifford R. Pettis, chief forester of the State and under whose guidance reforestation had its great start, I resolved to embark at once on the work of planting my barren lands. My first planting was made with 107,000 white pine transplants. These trees are now five and six inches in diameter and from 15 to 20 feet in height. This growth resulted on some of the poorest land on the whole preserve.

During the World War and up to 1923 we planted very little due to the scarcity of labor, but beginning with the next year I resumed reforesting and planted an average of a million trees a year until the spring of 1929. At this time, after a careful survey of the fire hazards and other problems, I decided that it was best to protect the plantations already made by building numerous fire roads and by carrying out several operations to guard against certain insect and fungus diseases which had attacked



Eight-Year-Old Red Pine Plantation on the Luther Forest Preserve

the small trees. For these reasons my efforts were changed from the planting to the then more necessary protective measures.

Just a word about these matters. The fire roads are from 60 to 70 feet wide through both the young plantations and the more mature stands. From this space all tree growth and bushes are removed, and from the center of the fire line for a width of 12 feet even the grass has been removed by plowing and disk harrowing. As a result, if a fire started among the young trees or in the larger timber, upon reaching this fire road, it would be stopped by this bare strip.

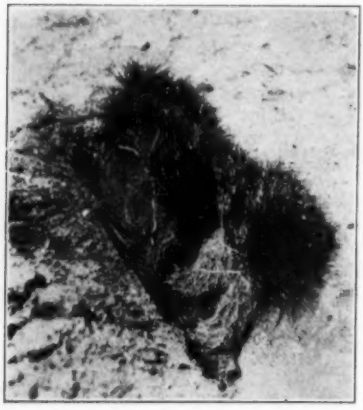
All of these protective measures add to the expense of raising timber, yet I am satisfied as the owner of the largest private reforested area in the United States to put "my all" in the small trees that will grow up with the younger generation and add so materially to their welfare. There is after all a great amount of real sentiment about the woods.

Reforestation on Arbor Day

BY GURTH WHIPPLE, NEW YORK STATE COLLEGE OF FORESTRY, SYRACUSE UNIVERSITY

As an Arbor Day observance, reforestation is one of the most convincing approaches in presenting forestry to pupils. It is easily understood; it is an interesting, moving, growing object lesson. The best place to teach reforestation is in the field. After showing pupils how the work is done, have them actually perform the operation of properly setting young trees in the ground. They will enjoy this unforgettable experience. Establish a school forest if possible.

Reforestation is so important from a practical viewpoint in relation to the welfare of the country that it would seem a necessary part of education. Material is generally available. Even in large cities, by careful planning, instruction in reforestation may be provided by trips into the country. It may be correlated with nature study, geography, botany or manual training. The camera may be used to advantage in producing pictures for study of the crown and root systems of trees. The motion picture film may be used to indicate how trees should be planted and to show trees in various stages of development in the tree nursery and all the processes from extracting seed to the



Properly Made Trench for Heeling in Young Trees so that Roots Will Be Kept Moist until Trees Are Planted

Carrying Young Trees in Pail, on the Bottom of Which Is Mud

Pupils of Erie County School Starting on Reforesting Trip

shipment of trees for planting. Such films may be obtained from the Forest Service, Washington, D. C.

Seedling trees may be brought to the schoolroom for examination and discussions. Diagrams may be used on the blackboard outlining the form or shape of the hole in which the young trees are placed and also showing how the roots of a planted tree should rest in a natural position and not with ends of some roots sticking out of the ground. A botany teacher may explain the various parts of a tree, including the root system, bole or trunk, bark, sap, branch, twig, leaf petiole, foliage. Diagrams of trees may be drawn to indicate these various sections. In connection with the subject of reforestation, pupils may study the needles of pines and spruces and note the difference between the species.

Interest may be aroused in forest trees by comparing them with the human race. A community of trees corresponds to a community of people in many ways.

The indirect influences of the forest are very important. The modulation of stream flow and prevention of erosion are vital factors in the well-being of any country. As a source of continuous water supply, both surface and underground, the value of the forest can not be overestimated. The forest is the home of many birds; birds are a great boon to agriculture. These are reasons why the idle land of the country should be planted with trees. All such trees will become the inheritance and property of the men and women of tomorrow. The treelings of today and the boys and girls of today will grow up contemporaneously.

Requests for trees should be made to the State Conservation Department. As soon as trees are received they should be placed in trenches in bunches near the place of planting. The trench should be in a shady place and should be covered with burlap to protect the trees if exposed to sunlight. Only the tops of the trees should appear above the ground. They ought to be moistened every day.

The planting crew should consist of two persons, one to make the holes and the other to follow up with the trees. The trees should be carried to the field in a pail with four inches of soil and water in the bottom to keep the roots of the trees moist. The trees should not be removed from the pail until it is time to place them in the holes and then should be taken out one at a time.

The best implement for digging holes is a mattock. The sod, five or six inches square, should be dug away first and thrown to one side. The mattock should then be swung into the earth with the blade in a perpendicular position, the handle lifted slightly, then pulled toward the individual who is making the hole.

In placing the tree, care should be exercised to get all the roots in a natural position. It is advisable to lower the tree a little farther than it will finally set in the ground and then pull

Trees Should Be Placed in Ground and Pressed in with Hand or Foot

it up a bit. This will help to straighten the roots. The tree should set in the ground slightly deeper than it stood in the nursery. An earth ring on the body of the tree usually marks the depth the tree stood in the ground at the nursery.

The planter packs the loose dirt firmly about the roots. When all of the soil is replaced except the sod, he presses it down with his foot, taking special care not to injure the bark. The usual spacing is six by six feet. Pure stands of white pine are inadvisable because of the depredations of weevils.

A method of keeping straight rows that has met with success, where pupils are concerned, consists in using a small rope strung across the field parallel with the advancing row of planters, a person at each end. Ribbons or rags are tied at intervals along this string, dependent upon the spacing to be used. As the trees in one row are set in the ground, a whistle is blown and the persons holding this rope advance to the next row, the pupils following the pieces of rag or ribbon. This method keeps the rows comparatively straight, is somewhat interesting and maintains uniform speed of planting.

Bulletin 863 of the United States Department of Agriculture, entitled Forestry Lessons on Home Woodlands, and Miscellaneous Circular 98, The Forest, a handbook for teachers, offer many ideas on this subject.

The New York State College of Forestry at Syracuse University will mail reforestation leaflets on request.

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Outdoor Study of Nature Offered in Allegany School

For the fifth season the Allegany School of Natural History will be conducted in the Allegany State Park south of Salamanca, N. Y. This is the only outdoor school of its kind in the State where work of college grade is given in the woods. The session will open July 8 and close August 27, 1931.

Field courses are given in botany, zoology, physical geography and geology, birds and nature study. Two full days a week are devoted to each subject so that the student has opportunities that can not be found in schools located in cities. It is a school for the amateur naturalist, the teacher who seeks a new approach to the natural history sciences and who has never had a chance to spend days in the forests and along streams, learning about nature under exceptional leaders.

The director of the School is Dr Robert E. Coker, and the dean of women is Mrs Coker. Doctor Coker also gives the course in general field zoology. The courses in physical geography and geology are given by Charles Brewer jr, of the University of Kansas; field botany by Lawrence E. Hicks, of Ohio State University; the courses on birds by Aretas A. Saunders, field naturalist of the New York State Museum, and the courses on nature study by William P. Alexander, field naturalist of the Buffalo Society of Natural Sciences.

The school is conducted by the Buffalo Society of Natural Sciences in cooperation with the New York State Museum. It is affiliated with the University of Buffalo, which gives college credits for the courses taken at the school.

Registration should be completed before June 1st. Applications should be made to Dr R. E. Coker, Box 950, Chapel Hill, N. C. A circular of information gives full details as to equipment needed by each student. The cost of tuition, board and lodging is $150 for the session.

The climate of the park is similar to that of the Adirondacks, so that it makes a delightful region in which to spend the summer.

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